CR-131900

PROGRESS REPORT, TYPE I, MARCH-MAY 1973

1.1 Categorisation of discipline and subdisciplines

3. GEOLOGY

J. LITHOLOGICAL SURVEYS

K. STRUCTURAL SURVEYS

1.2 Title of the Investigation

Evaluation of the potentials of the ERTS techniques for geological mapping purposes.

2. Proposal number

SR. No. - 0569/3

3. Principal Investigator's name and organisation

Drs. H.E.C. van der Meer Mohr.
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4. Objectives

To evaluate MSS imagery in terms of data-producing capability for geological mapping purposes. This concerns especially the detectability of the geological, stratigraphic and structural units.

Comparision with aerial photographic techniques to assess the relative merits for this type of terrain.

5. Summary of accomplishments

A short account of accomplishments during the reporting period and those planned for future are given below.

5.1 Preparatory phase - Before receiving the imageries the following steps were taken to attain the state of readiness for analysis of ERTS data.

i) All the available literatures were consulted and other useful and necessary literatures were ordered.

ii) Purchase orders for Additive Color Viewer and Groundtruth radiometer were placed. The radiometer has already been received.

E73-10584) EVALUATION OF THE POTENTIALS OF THE ERTS TECHNIQUES FOR GEOLOGICAL MAPPING PURPOSES Progress Report, Mar. - May (International Inst. for Aerial Survey and) 5 p HC $3.00 CSCL 08G G3/13 N73-23444 Unclas 00584

iii) Other facilities were arranged and made available to the investigators at the Institute of Aerial Surveys and Earth Sciences (I.T.C.).

iv) A detailed analysis plan for various phases of studies including quick look analysis of full frame, detailed qualitative and quantitative analysis on selected subframes, groundtruth data collection and radiometric analysis, was prepared.

v) The image from the microfilm was photographed, enlarged and used for planning purpose.

vi) Photogeological analysis of Montalban test site was carried out with available black and white, color and infrared black and white aerial photos of 1 : 30,000 scale and a detailed photogeological map was prepared.

vii) A surface cover type map for machine assisted data analysis was also prepared.

5.2 Receipt of data – The following data were received from NASA on 6th April, 1973.

i) Bulk processed System corrected 9.5 inch transparencies of four MSS bands for two frames. Recently another set has also been received.

ii) 70 mm negatives of the same.

One set of transparencies (1028–10200 M) are of good quality whereas 40% of the other set (1064–10195 M) was cloud covered. The negatives of the above sets are very dark and not of good quality. The first set was taken up for study. The recently received transparencies and negatives (1227–10271 M) are of moderate quality and will be taken up for full frame analysis.

5.3 Preliminary Analysis phase – This phase includes the following steps.

5.3.1 Photographic reproductions – Enlargements were made from the negatives. Sensitometric tests were carried out on the quality of the reproduced prints and various steps were taken for improvement of photographic reproduction.
Enlargements from transparencies are also being tried.

5.3.2 Techniques employed – Various techniques applied for the study of the imageries include

i) Visual examination of separate band information on light table with and without magnification.

ii) Examination of different combinations of band information under stereoscope without stereovision.

iii) Stereoscopic examination with different set of imageries on overlapping portions.

iv) Examination of photographic enlargements.

v) Examination of enlargements through table projector.

vi) Preparation of 24 x 36 mm slides from 9.5 inch diapositives and examination of enlargements of 1 : 100,000 and 1 : 50,000 scale through 35 mm projector.

5.3.2 Quick look analysis - Procedures followed for quick look analysis are

i) Quick visual examination of different band information and comparative study of various features on them.

ii) Preparation of several overlays with the above mentioned techniques. The following transparent overlays of the full frame was prepared.

a. Overlay showing grid of co-ordinates to study the geometric fidelity of the images.

b. Overlay showing vegetation, human activities and cultural features.

c. Overlay showing morphotectonic units and drainage system.

d. Overlay showing geological features including major lithological and structural units.

iii) Preliminary densitometric studies at randomly selected points (selection based on tone variations and existing knowledge of material classes) on full frame and preparation of clusture diagrams as a first step to quantitative and automated analysis feasibility study.

5.4 Future Plans

i) As soon as additive color viewer is available analysis on various combination color composites and false color composite will be carried out. Color composites are also being ordered from NASA.

ii) Detailed lithological and structural analysis on selected subframes with 1 : 100,000 and 1 : 50,000 enlargements is in progress.

iii) The investigators are ready for proceeding to field for groundtruth data collection and ground radiometric study.

6. Problems encountered

According to original proposal the ERTS data was to be received in January 1973, instead it was received in April 1973. Hence the type I report is being sent now.

Photographic enlargements from 79 mm negatives were not useful for study due to low quality of the negatives.

7. Discussion of Significant Results

Preliminary analysis of the full frame images show the following significant results.

i) The techniques employed were found quite suitable for study purpose.

ii) The positional accuracy of the system corrected bulk processed MSS images is about 100-400 m.

iii) Drainage is well depicted, particularly in bands 4 and 5, and morphotectonic features could be recognised.

iv) Water bodies are clearly shown in MSS 7 band.

v) Major roads, railway lines and large towns are more or less detectable on MSS 6 and 7 bands.

vi) Vegetation and agricultural areas are recognisable at many places.

vii) Major rock formation boundaries, in general, are more or less clear. The area being that of variable lithology with many thin units boundaries of all the lithologic types could not be traced. However, at places minor changes in lithology are also clearly seen.

viii) Some of structural trend including folded and linear structural elements are clear.

ix) MSS 5 and 7 bands appear to be most useful for the visual analysis.

x) Quick look analysis suggests that regional geological mapping on ERTS imageries of the study area will probably be quite feasible. However, detailed analysis, visual and quantitative, on subframes, which is under progress may render more significant results.

8. Significant changes in operating procedures

No significant changes in operating procedures are made.

9. List of Published articles

No articles have been published.

10. Recommendation concerning practical changes in operation

No recommendations are given at this stage of work.

11. ERTS image descriptor forms

See attachment.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
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N
ID

DATE

PRINCIPAL INVESTIGATOR Drs. H.E.C. van der Meer Mohr

GSFC ID F 0430

ORGANIZATION International Institute for Aerial Survey and Earth Sciences (I.T.C.)

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1028 – 10200 m				Alluvial Plain Anticline Basin Dendritic Drainage Divide Fault Fold Geology Highway Lake Lineament Meander Parallel Drainage Rail road Syncline Vegetation
1064 – 10195 m				Alluvial Plain Basin Chaotic Cloud Pattern Fold Geology Vegetation

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

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